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ABSTRACT

The review describes the advance organizer technique and reviews the empirical evidence on the effectiveness of advance organizers with both normal students and students classified as handicapped. Examples of advance organizers include the expository advance organizer, the comparative advance organizer, the graphic advance organizer, and principles as advance organizers. The review concludes that analysis of well-designed studies offers tentative support for the advance organizer technique if the material to be learned is not well-organized to begin with and if students have limited prior knowledge of the subject. The lack of research using advance organizers with students with disabilities is noted. Suggestions are then offered for use of the technique with learning disabled students; suggestions include understanding the distinction between advance organizers and overviews, not using them if the material is already well organized, the greater usefulness of advance organizers when material is presented verbally, and the value of writing the organizer on the blackboard if used with a verbal presentation. It is suggested that advance organizers may help learning disabled students learn to organize information for themselves. (Author/DB)

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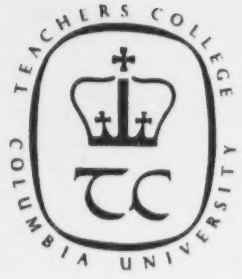

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THE USE OF ADVANCE ORGANIZERS TO AID LEARNING AND RECALL

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Technical Report #34

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INTRODUCTION

New information is easier to learn and remember if it is organized and linked to existing knowledge. There are several organizing schemes which people use to aid learning and remembering. Most normally developing children learn to impose organizing schemes on information which they are expected to learn and remember (Waters & Andreassen, 1983). Learning disabled children, by contrast, are less inclined to impose organization on information to be learned and remembered (Worden, 1983). While there is evidence that learning disabled children can be taught to organize, it isn't yet known if they will acquire a general propensity to organize.

An alternative to teaching children to organize information for themselves is to organize it for them. Information, presented either verbally or as text, may be organized as it is prepared for presentation to the student. There are examples of carefully structured text. There are probably fewer instances of carefully structured verbal presentations in the classroom.

Ausubel (1963) proposed an additional technique, the advance organizer, for use when carefully structured material is not available or when embedded organization, alone, is insufficient to aid learning and recall. According to Ausubel, an advance organizer is

> introduced in advance of the new learning task per se; is formulated in terms that, among other things, relate it to and take account of generally relevant background ideas already established in the cognitive structure; and is presented at an appropriate level of abstraction, generality, and inclusiveness to provide specifically relevant anchoring ideas for more differentiated and detailed material that is subsequently presented (p. 167-168).

Advance organizers represent the teacher's attempt to make the organization of material to be learned and remembered expicit for the student, in advance of the presentation of the material. Advance organizers reduce, or even eliminate,

the need for the student to organize the material.

The purpose of this report is to describe and illustrate the advance organizer technique and to review the empirical evidence on the effectiveness of advance organizers with students who are progressing normally in school and with students classified as handicapped. The assumption underlying the report is that teaching children to organize information for themselves and organizing information in an effective way for children are not mutually exclusive options for the teacher of leaning disabled children. Teachers need to know about and be able to use both options for remedial instruction.

THE ADVANCE ORGANIZER TECHNIQUE

Advance organizers are concepts or principles introduced before the presentation of the main body of instructional material. They are chosen for their usefulness in explaining and organizing the material. According to Ausubel (1968), the function of the advance organizer is to "bridge the gap between what the learner already knows and what he needs to know before he can successfully learn the task at hand" (p. 148).

When the student already possesses adequate background knowledge for the new task, Ausubel suggests that advance organizers probably facilitate learning and retention by mobilizing whatever relevant anchoring concepts already exist. These concepts then take on the role of subsumers. The new material is made more meaningful as it is assimilated by relevant antecedent ideas. Advance organizers at the appropriate level of inclusiveness ensure that subsumers are specifically and explicitly relevant to new ideas (Ausubel, 1968).

When students lack adequate background knowledge, they have few directly relevant subsumers already available. Advance organizers then provide the relevant subsumers. The need for rote memorization of unfamilar material is lessened (Ausubel, 1968).

Advance organizers, then, either activate knowledge already acquired which can be used to subsume new information or provide the subsumers for the new information. There are two main types of advance organizers: expository organizers and comparative organizers. Expository organizers ensure contrasts between new information and existing knowledge. Comparative organizers are recommended when new information is so similar to existing knowledge that the new and old might be easily confused.

Advance organizers are different in content and function from overviews or summaries presented in advance of the learning task. According to Ausubel (1977), overviews simply repeat important ideas and key terms at the same level of inclusiveness with which they are found in the text. Overviews lack the inclusiveness to act as subsumers, and they make little attempt to relate new ideas to prior learning. As a result, they are less likely to lead to enhanced learning or transfer of new concepts. To the extent that overviews facilitate learning and retention, they do so, Ausubel suggests, by focusing attention on the most important information. Overviews may also encourage overlearning by repeating key terms and concepts.

EXAMPLES OF ADVANCE ORGANIZERS

For purposes of illustration, examples of an overview, an expository advance organizer, a comparative organizer, and a graphic organizer are presented. These examples pertain to teaching multiplication concepts and facts and precede the presentation of the learning material. Finally, an illustration of the use of principles as advance organizers is presented.

The Overview

An overview, one that summarizes the information found in the multiplication matrix, might simply state that the matrix provides a quick way of answering basic multiplication questions. It might inform students that all the basic multiplication facts can be found in the matrix (e.g. 4 x 5 = 20, 6 x 2 = 12). The overview is expressed at the same level of generality as the matrix and offers no conceptual framework to assist understanding of multiplication concepts or recall of multiplication facts.

The Expository Advance Organizer

Using the example of a multiplication matrix, Joyce and Weil (1972) illustrate what is meant by Ausubel's expository advance organizer. They suggest preceding the presentation of the matrix with a discussion of the commutative property of multiplication (e.g., A x B = B x A). Joyce and Weil (1972) write

> the exposition of the material in the multiplication matrix can be at least partly organized by the learner in terms of commutation. He will be prepared for ideas like 3 x 2 = 2 x 3, and his memory task will be considerably reduced. The organizer, the commutative property, is more abstract than the multiplication facts themselves, but they are explained in terms of it (p. 173).

The Comparative Advance Organizer

The comparative advance organizer, one that differentiates between easily confused concepts, is also illustrated by Joyce and Weil (1972) using the example of the multiplication matrix. They suggest

> when the learner is being introduced to long division, a comparative organizer might be introduced that would stress the similarity and yet differentness of the division facts from the multiplication facts. For example, whereas in a multiplication fact the multiplier and the multiplicand can be reversed without changing the product, that is 3 x 4 can be changed to 4 x 3, the divisor and dividend cannot be reversed in division without affecting the quotient, that is, 6 divided by 2 is not the same as 2 divided by 6. This comparative organizer can help the learner see the relationship between multiplication and division and therefore anchor the new learning about division in the old ones about multiplication. At the same time, the comparative organizer can help him discriminate the new learnings so that he does not carry over the concept of commutability to a place where it does not belong. (p. 173-174).

The Graphic Advance Organizer

In an effort to extend the use of advance organizers, Barron (1972) proposed a graphic advance organizer. Graphic advance organizers are

> visual and verbal presentations of the key vocabulary in a new learning task in relation to subsuming and/or parallel terms that presumably have previously been incorporated into the learner's cognitive structure (Estes, Mills & Barron, 1969, p. 41).

In contrast to prose organizers which are prepared in advance and presented to the student, graphic organizers are developed through an interactive process which engages the student and teacher in the task of identifying key concepts to be learned and relating them to the student's existing knowledge. This technique is particularly useful in the classroom. The teacher clarifies key concepts and determines the students' level of background knowledge during the course of the discussion. The graphic advance organizer is then modified to match the students' knowledge with the requirements of the task (Barron, 1972).

Barron provides the following directions for developing a graphic organizer.

1. Analyze the vocabulary of the task and list all the words that you feel are important for the student to understand.

2. Arrange the list of words until you have a scheme which depicts the interrelationships among the concepts particular to the task.

3. Add to the scheme vocabulary terms which you believe are understood by the students in order to depict relationships between the task and the discipline as a whole.

4. Evaluate the organizer. Have you clearly depicted major relationships? Can the overview be simplified and still effectively communicate the idea you consider to be crucial?

5. Introduce the students to the task by displaying the scheme and informing them why you arranged the terms as you did. Encourage them to contribute as much information as possible.

6. During the course of the task, relate new information to the organizer as it seems appropriate (p. 10).

An example of a graphic advance organizer developed in conjunction with a ninth grade mathematics lesson is presented (Earle, 1969, p. 54).

Mathematics

Algebra Trig. Geometry Arithmetic

points lines planes

Rational Numbers

Fractions (non-integers) Integers

Common Fractions Decimal Percent positive negative

members ratio hundredths

hundredths base percentage

numer.

denominators

comparison proportion

hundredths

means scales

extremes

Principles as Advance Organizers

Drawing upon his experience with advance organizers designed for preschool children, Lawton (1982) provides an example of an advance organizer to teach basic principles of classification by a single attribute. In lieu of a prepared script, Lawton presents the teacher with guidelines for introducing the organizer. He then offers an example of a lesson applying the organizer and suggestions for related learning activities. The teacher's guide to the advance organizer lesson lists the following eight organizing principles to be incorporated into the advance organizer lesson according to the teacher's own teaching style and the students' level of cognitive readiness.

1. Sometimes we may wish to place objects into groups. This helps us remember how objects go together in some way. There is a special way we can use to put objects together into groups.
2. First look at all the objects we have.
3. Look to see what properties they have (children have learned the concept, property).
4. Look to see if any of the objects have a property they share.
5. Collect all the objects that share that property.
6. Make sure to choose all the objects that share that property.
7. When choosing the objects, think about that one property. Do not change from that property to another property.
8. Make as many groups as you can in this way (Lawton, 1982, p. 306).

The teacher is encouraged to demonstrate the eight organizing principles of the advance organizer within the context of a learning activity. For example, the teacher may choose a story format with a plot that requires the main character to make grouping decisions. Concrete materials are used to represent the array of objects the story character must sort into groups. The teacher and students together act out the story, verbalizing each organizing principle as it occurs.

Several such activities, differing in content and format but all requiring attention to the rules presented as an organizer, are provided. These are followed by independent activities for reinforcement purposes (Lawton, 1982).

EXPERIMENTAL STUDIES OF ADVANCE ORGANIZERS

Evidence collected over the past twenty years presents a diverse picture regarding the facilitative effects of advance organizers. Early research by Ausubel and his colleagues provided support for the use of advance organizers. Subsequent investigations by other researchers have led to both supportive and contradictory conclusions. Consequently, it is necessary to examine the conditions under which organizers have been effective, as well as those under which they have failed. These conditions include variations in organizers, learner characteristics, learning tasks, recall measures, and research methods.

We begin by examining Ausubel's own advance organizer reasearch. Ausubel's work is supplemented by a selected review of studies in which advance organizers were used with school age students. This includes experiments with educable mentally retarded, emotionally disturbed and learning disabled students. Finally, generalizations regarding the efficacy of organizers under varying conditions are drawn from critiques of the literature.

Ausubel's Research

Ausubel's major advance organizer experiments used written advance organizers of approximately 500 words and written material that was unfamiliar or highly technical in nature, ranging in length from 1400 to 2500 words (Ausubel, 1960; Ausubel & Fitzgerald, 1961, 1962; Ausubel & Youssef, 1963). The four studies used undergraduate students from a midwestern college and used multiple choice tests to measure learning and retention. Written historical introductions of 500 words, presented in advance of the learning task, were used in all four studies as control conditions. Students received more than one exposure to the organizer or historical introduction before studying the passage they were

expected to know.

Ausubel's first study compared the effectiveness of an advance organizer to that of an historical introduction (Ausubel, 1960). The learning passage dealt with the metallurgical properties of steel. The historical introduction (control condition) was reported to contain no conceptual material that could serve as an anchoring framework for the material to follow. The expository advance organizer (experimental condition) was written at a high level of abstraction and inclusiveness and was tested to guarantee that it did not contain specific information that alone could improve performance on the recall test. The treatment groups were equated for learning ability, field of specialization, and sex. Retention was tested three days after the learning task by using a multiple choice test. Results indicated that the advance organizer group performed significantly better than the control group on the measure of retention (Ausubel, 1960).

Ausubel and Fitzgerald (1961) followed a similar design using three treatment groups (expository organizer, comparative organizer, historical control) to examine the effect of organizers when new information (2500 word passage on Buddhism) could be related to existing knowledge (Christianity). Subjects were equated for knowledge of Christianity and verbal ability. Retention was tested three and ten days following the presentation of the experimental task by using equivalent forms of a multiple choice test.

Results of the first retention test indicated that the comparative organizer led to significantly higher recall scores than either the expository organizer or the control introduction. Further analysis revealed that the difference was due primarily to the performance of students with low scores on the Christianity

pretest. On the delayed retention test, both the comparative and expository organizer groups outperformed the control group. Again, the students with limited Christianity knowledge benefited most from the organizers (Ausubel & Fitzgerald, 1961).

Ausubel and Fitzgerald (1961) concluded from this study that learning and retention of the passage about Buddhism varied positively with the enhanced ability of the students in the organizer groups to discriminate new concepts from previously learned, related concepts about Christianity. The organizers were particularly effective for those students with limited related knowledge (Ausubel & Fitzgerald, 1961).

A supplementary investigation revealed that the comparative organizer alone, studied without the learning text, resulted in higher than chance scores on the retention test. Ausubel and Fitzgerald interpreted this finding by suggesting that the comparative organizer did not provide direct answers to questions. More likely, it added to the students' knowledge about Buddhism and helped them eliminate false answers on the multiple choice retention test. The authors did not view this finding as invalidating the original study or its conclusions (Ausubel & Fitzgerald, 11).

Ausubel & Fitzgerald (1962) next studied the effects of one expository advance organizer on two sequential learning passages dealing with endocrinology. The information presented in the second passage was contingent upon successful learning of the first passage. Treatment groups (expository advance organizer and historical introduction) were equated for general endocrinology knowledge, verbal ability, and sex. The first retention test followed the presentation of the first passage by two days. The second passage was administered three days later and was, in turn, followed by a retention test four days later. The

organizer and control tasks were administered prior to the first passage only. The effect of the organizer alone without the learning text was not tested (Ausubel & Fitzgerald, 1962).

Results of the first retention test indicated that the expository organizer enhanced retention only for those students whose verbal aptitude scores placed them in the lower third of the group. The earlier organizer, however, showed no facilitative effects for the retention test following the second passage. Instead, recall performance following the first passage emerged as the major contributor to recall perfromance following the second passage. An interaction between treatment condition and general endocrinology knowledge suggested that the organizer helped students to utilize relevant background knowledge in structuring unfamiliar material (Ausubel & Fitzgerald, 1962).

Several differences between the results of the 1961 and 1962 studies are noteworthy. The effectiveness of the organizer for low verbal ability students, as evidenced in the endocrinology study, was not apparent in the Buddhism study. Second, students lacking background knowledge benefited most from the organizer in the Buddhism study. However, it was the students with greater background knowledge who benefited from the endocrinology organizer. Ausubel and Fitzgerald suggested that the first study dealt with familiar, but easily confused concepts. Where background knowledge about Christianity was adequate, the clarification provided by the comparative organizer was redundant. In contrast, the endocrinology material was basically unfamiliar to all students. What little background knowledge was available most likely acted in such a way as to make potentially nonmeaningful material more meaningful, thereby improving rentention (Ausubel & Fitzgerald, 1962). A comparison, then, of the two studies suggests a complex interaction between task difficulty, student ability, background

knowledge, and type of organizer.

Ausubel & Youssef (1963) returned to questions raised by both the 1961 and 1962 studies. They tested the effects of comparative organizers introduced before both of two sequentially related passages on Buddhism and Zen Buddhism. The first organizer compared concepts of Christianity and Buddhism, while the second compared Buddhism and Zen Buddhism. A control group received historical introductions prior to each passage. The first multiple choice retention test followed two days after passage one. The second test was administered one week after the presentation of passage two. The materials used in the first half of the experiment were those used in the 1961 study. Higher than chance recall scores following study of the organizer alone were obtained in both the 1961 and 1963 studies. As before, student groups were equated for verbal ability and knowledge of Christianity (Ausubel & Youssef, 1973).

Results indicated that the Buddhism organizer facilitated recall of the Buddhism passage regardless of verbal ability or Christianity knowledge. Although trends suggested the organizer was more effective for those students with low verbal ability, unlike the endocrinology study, this difference did not reach signficance. Ausubel and Youssef suggested that the more able students might have used exiting knowledge to generate their own organizing framework (Ausubel & Youssef, 1963).

The second organizer in the study failed to facilitate recall of the Zen Buddhism passage. Performance on both passages was affected by previous knowledge: high Christianity knowledge in turn aided Zen Buddhism learning. Despite the nonsignificant effect of the second organizer, the study clearly supports Ausubel's theory of the role of existing knowledge in acquiring new information.

The investigations by Ausubel and his colleagues offered substantial

empirical support for advance organizers. Their work generated extensive research using different organizers under a variety of conditions. Equivocal results have been obtained from these studies. Researchers have found it difficult to define advance organizers (Barnes & Clawson, 1975; Harley & Davies, 1976). Harley and Davies (1976) questioned the generalization of Ausubel's findings beyond the college population with which he worked. Interpretation of Ausubel's findings has also been hindered by the limited information available regarding the level of task difficulty and the content of multiple choice test items used. Faw and Waller (1976) questioned the use of historical introductions as a control condition. They argued that such additional information might have compounded the difficulty of the learning task for control subjects. They suggested, instead, that the control subjects spend additional time studying the text.

Over 100 studies have investigated the effects of organizers since Ausubel's preliminary experiments (Luiten, 1979). Variations in organizers, tasks, recall measures, and student characteristics have broadened the range of available data. The theoretical and methodological implications of several studies, primarily those with young students, are presented below.

Other Research with Normally Developing Students

West and Fensham (1976) conducted three experiments with high school students to test Ausubel's hypotheses that 1) related prior knowledge plays a subsuming and organizing role in new learning, 2) students with deficient background knowledge will be helped by advance organizers, and 3) students with adequate background knowledge will find organizers redundant. In West and Fensham's studies all students were tested for background knowledge in the

subject area and randomly assigned to an experimental and/or control group. Students in the experimental group received a written advance organizer intended to present and clarify general organizing principles of chemical equilibrium. In addition, the learning material that followed included organizing summaries interspersed throughout the text. The control group received an information overview prior to the new text. The control text did not include interspersed organizers. A multiple choice examination was given one week later. The results indicated a significant effect in favor of the organizer condition. These results were replicated by a parallel study using a comparable student sample (West & Fensham, 1976).

A third study provided a remedial teaching session prior to presentation of the introductory passages and learning texts. By doing so, the significant effect of the organizer was erased. West and Fensham (1976) interpreted their findings as supportive evidence for the advance organizer technique.

Alexander, Frankiewicz, and Williams (1979) studied the effects of organizers on learning and retention of social studies content presented in lecture format to fifth, sixth, and seventh grade students. Students in the experimental condition received organizers in either a visual (slide presentation) or verbal (discussion) format. Advance and post organizers were used. Students in the control group received additional instruction to equate time expended by all students. The experimental condition produced significantly superior learning and retention in both immediate and delayed multiple choice tests. Further analysis revealed no significant differences between position of organizer (advance or post) or between modes of presentation (visual or verbal). Alexander's study extends support for Ausubel's hypothesis beyond the limits of written organizers presented prior to written texts (Alexander, Frankiewicz,

& Williams, 1979).

Lawton and his colleagues investigated the effects of concrete advance organizers on learning, retention, and transfer by preschool and elementary age students (Lawton, 1977, 1978; Lawton & Blue, 1979; Lawton & Fowell, 1978; Lawton & Wasanka, 1978). Learning tasks involved classification, seriation, and conservation problems.

Advance organizers used materials which the children could pick up and move. Measures of learning, retention, and transfer were based on the same materials. Lawton's studies demonstrated that elementary students receiving organizers appropriate to their level of cognitive maturity outperformed students in control conditions on measures of learning, retention, and transfer. Lawton and Wasanka (1978) demonstrated that conceptual and process oriented organizers were more effective than organizers that stressed content alone. Lawton and Fowell (1978) found significant positive effects for concrete organizers presented to preschoolers over a seven week math instructional period. Most recently, Lawton and Blue (1979) demonstrated the effectiveness of expository organizers over guided self-discovery organizers. Research by Lawton and his colleagues demonstrated that the advance organizer technique can be used successfully with young children.

Christie and Schumacher (1976) studied the effect of a verbal advance organizer (topic sentence) on free recall of relevant and irrelevant facts embedded in a narrative passage presented orally. Students (first and fourth graders) in the control group were later questioned to determine if and when they had spontaneously generated an advance organizer during the passage presentation. Results from this study did not reveal significant differences between treatment groups for the total number of facts recalled. Further

investigation indicated, however, that 88% of the older control students and 55% of the younger control students generated their own advance organizers. The earlier a student generated an advance organizer, the greater was his/her recall of relevant facts.

The authors concluded that children who are not given an advance organizer actively search for an inclusive structure which provides an organizing framework for material to be learned. They hypothesized that such searching will be most successful when the learning material is easily comprehended and supported by background knowledge. In situations where material is unfamiliar or highly technical, students will be less likely to generate their own organizer and more likely to benefit from a prepared advance organizer. Christie and Schumacher's findings support Ausubel's theory of the role played by organizers in verbal learning. Additionally, they offer a significant qualification to Ausubel's position on spontaneous as opposed to prepared advance organizers (Ausubel, 1968).

As with prose advance organizers, research utilizing graphic advance organizers has yielded mixed results. Estes, Mills, and Barron (1969) conducted two parallel studies comparing graphic advance organizers to control conditions presented prior to social studies and science lessons. Significant results were found for the organizer used with the science lesson only. Earle (1969, 1970) used graphic advance organizers with seventh grade math lessons. He found significant results on measures of delayed achievement, but did not find beneficial effects of the organizer on measures of immediate achievement. Subsequent investigations have compared graphic advance organizers and control conditions without finding positive evidence in favor of either organizer format (Barron, 1972; Barron & Cooper, 1973; Estes, 1972).

Research With Handicapped Students

Although there is a clear need for facilitative memory techniques for students with learning problems, few advance organizer studies have been conducted with handicapped children. Three studies reviewed below failed to demonstrate improved performance by educable mentally retarded and emotionally disturbed students following exposure to advance organizers. The fourth study with mentally retarded students suggests that advance organizers may facilitate learning from text but not from oral presentations. A fifth study suggested a facilitative, although still nonsignificant, effect for use of the advance organizer technique with learning disabled students.

Blackhurst (1974) presented tape recorded introductory passages to educable mentally retarded adolescents (mean IQ 71). Students were randonly assigned to one of three groups receiving, either an expository advance organizer, a traditional introduction, or an unrelated control introduction. After repeated exposure to the introductory passages, students heard a recorded lecture on the legislative process in the United States. Oral multiple choice tests of learning and retention followed immediately and twelve days after the lecture. No significant differences were found between the advance organizer and the traditional introductory conditions on either learning or retention measures. Blackhurst suggested that the common practices in teaching the mentally retarded which stress movement from the concrete to the abstract, may place retarded students at a disadvantage when they are presented with organizers that progress from the abstract to the concrete.

Neisworth (1968) compared the ability of retarded and nonretarded students to benefit from written organizers that preceded a passage on the physical properties of sound. Nonretarded 8 year olds (mean IQ 118) and educable mentally

retarded 15 year olds (mean IQ 75) received two exposures to advance organizer or control passages. Multiple choice learning and retention tests followed immediately and two weeks after the learning task. The reading difficulty of the materials was reported to be within the ability range of all the students in the study. The organizer and control introductions were evaluated by a panel of judges to ensure they were appropriately designed.

The organizer facilitated learning and retention for the nonretarded group only. No significant differences were found between organizer and control conditions for the retarded students. Neisworth offered several explanations for the nonsignificant findings obtained with the retarded students. They might have been unable to deal with the abstract concepts found in the advance organizer. They may have failed to generalize the concepts in the organizer to the learning task. Or, the abstract to concrete sequence embedded in the experimental materials differs from the concrete to abstract teaching sequence often stressed in special education classrooms for the retarded (Neisworth, 1968).

Boersma (1979) investigated the use of videotaped advance organizers for teaching English grammar to emotionally disturbed adolescents. Using a counter-balanced design, intact class groups were assigned to control or organizer conditions for two of four sessions, each consisting of an introduction, lesson, and posttest. Posttest items tested both factual learning and application of new learning. Students were pretested to determine prior knowledge of English grammar. Data analysis indicated no overall facilitative effects of advance organizers, regardless of prior background knowledge. However, item analysis indicated that advance organizer groups performed better on application test questions than did control groups for three of the four lessons.

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The most recent study of the advance organizer technique with educable mentally retarded students (mean IQ not reported) was conducted by Peleg and Moore (1982). A unit of instruction, 1,000 words long, about the use of monkeys as substitutes for human subjects in scientific experiments was constructed to conform with the students' reading ability. Two introductions to the unit were written. One was a traditional introduction, 130 words long, describing the life of monkeys in the forest. The second was an advance organizer, 150 words long, which emphasized the similarities between humans and monkeys.

Ninety-six students (between the ages 13 and 16) who had been classified as educable mentally retarded were randomly assigned to one of six instructional conditions: no introduction, oral (unit on tape) presentation; no introduction, written presentation; traditional introduction, oral presentation; traditional introduction, written presentation; advance organizer, oral presentation; and advance organizer, written presentation. Twenty multiple-choice questions were developed to test students' recall and comprehension of the material in the unit. Ten questions tested recall of facts (low-level questions). Ten questions required students to think beyond the actual information in the unit (high level questions). The twenty questions were constructed as pairs so that one high level question and one low level question related to similar material. Students read the unit or listened to it on tape in one session and then were assembled in small groups for the recall/comprehension test. Examiners read the questions to the students who marked their answers in answer booklets.

As with many other advance organizer studies, the results from this study were not conclusive. Across all conditions, students answered more low-level than high-level questions correctly. The advance organizer was least effective with the oral presentation and the most effective with the written presentation.

The number of low-level questions answered correctly was highest with the oral presentation, no introduction. The number of high-level questions answered correctly tended to be highest with the advance organizer, written presentation. The investigators were aware that there were substantial differences in the oral and written versions of this task (for example, with the written task, students could re-read and control the presentation of the material by the rate at which they read; students couldn't control the rate of presentation on the tape and re-playing the tape was more difficult than re-reading), which interacted with differences in the introductions in a complex fashion. The most useful interpretation of this study is that it illustrates that the effects of advance orgzaniers are determined, primarily, by task characteristics.

Edgar (1981) examined the effect of categorical advance organizers on expository passage recall by learning disabled and nondisabled students in the fourth, fifth, and sixth grades. Materials were two expository passages of comparable difficulty describing the appearance, eating habits, living environment, and general behaviors of an unfamiliar animal. The facts presented in each story were organized into paragraphs according to category. Presentation of the passages was counterbalanced for pretest and posttest phases.

During the pretest phase, the selected passage was read to and then read by each student to minimize any decoding difficulties that may have otherwise interfered with the task. Students were directed to learn the facts in the story for later recall. Free recall was recorded for two separate recall trials, each following study periods of two minutes. Subjects from each group were subsequently ranked on the basis of their pretest trial 2 recall scores and assigned from blocks of two to either the advance organizer or the practice (control) condition. Statistical analysis confirmed the equivalence of

treatment condition assignments within each subject group.

For students in the practice condition, posttest procedures repeated the pretest procedures in which students were directed to learn the facts for later recall. Students in the advance organizer condition received a verbal advance organizer prior to each study period. The organizers identified the four categories of facts embedded in the passage and instructed the students to keep the categories in mind while studying. Category cue cards were provided as an additional study aid. Posttest trial 1 and trial 2 recall was measured following two minute study periods. Pretest and posttest procedures also included probes to determine each subject's related knowledge and the extent to which they were aware of the structure of the passage.

Results suggested a facilitative although nonsignificant effect of the advance organizer for both learning disabled and nondisabled students on trial 1. The strength of this advantage, however, appeared insufficient to withstand the positive effects of additional practice during the second trial. Although nondisabled students consistently recalled more facts than learning disabled students, the effect of the advance organizer did not differ between groups. Supplemental analysis indicated that the majority of students in both the advance organizer and control groups recognized all four categories of facts found in the passage (Edgar, 1981).

These results were interpreted in light of a probable interaction between treatment and materials. It is suggested that the categorical organization of the stimulus passages was sufficiently evident to function as a spontaneous organizer for students in the practice condition, particularly during the second recall trial. Consequently, the comparative advantage derived from the advance organizer during trial 1 was eliminated (Edgar, 1981).

Reviews of the Empirical Work

Barnes and Clawson (1975) reviewed 32 advance organizer studies in an attempt to respond to questions raised by the diverse empirical findings. After examining studies one attribute at a time, (age of students, ability level of students, position of organizer, subject matter of experimental task, etc.), they concluded that the efficacy of advance organizers wasn't proven, nor had any patterns emerged indicating the most favorable conditions for the use of advance organizers. These conclusions have been challenged by several subsequent literature reviews (Ausubel, 1978; Faw & Waller, 1976; Mayer, 1979a, 1979b).

Kozlow (1978) and Luiten, Ames and Ackerson (1980) reviewed 77 and 135 advance organizer studies, respectively, by using Glass's meta-analysis technique. Conclusions from the Luiten et al. analysis are particularly instructive. Advance organizer studies were grouped for analysis in an effort to study the specific influence of such variables as subject matter, grade level of subjects, organizer presentation mode and subject ability level. Studies were also separated to examine the effect of advance organizers on learning (immediate tests) and retention (delayed tests; usually, however, within 4 weeks of the original presentation of the material).

The investigators' general conclusion was that advance organizers have a facilitative effect on both learning and retention. However, the effect of the advance organizer appears to increase, rather than decline, over time. Luiten et al. also concluded that aural advance organizers may be more effective than written advance organizers and that advance organizers are effective with individuals at all ability levels but may be most effective with high ability individuals.

Another review of the advance organizer literature was done by Mayer

(1979a). He first identified six conditions to be met in order for organizers to be effective

1. The material must be unfamiliar to the student and should not itself contain or elicit a subsuming context
2. The material must be potentially meaningful and conceptual
3. The advance organizer should provide or locate an appropriate subsuming context
4. The organizer should encourage the student to use the subsuming context
5. The student should not already have a relevant subsuming context for the material; or the learner should be one who would not normally try to use a subsuming context that he/she already had
6. The response measure should assess meaningful learning, long-term retention and transfer of knowledge

Mayer then reviewed 44 published advance organizer studies. Each study was evaluated to determine if the learning task lacked an assimilative context, if the advance organizer was appropriately designed, and if the results indicated facilitative effects of advance organizers. The majority of the studies meeting both learning task and organizer requirements showed positive effects for organizers. In addition, many of the studies reporting nonsignificant differences utilized introductions that did not clearly meet the requirements of an advance organizer, Mayer (1979a) concluded

> This analysis suggests that there is adequate support for the statement that advance organizers result in small but consistent advantages over control treatments, especially when material is poorly organized, material is unfamiliar, and subjects are inexperienced. However, more specific, better controlled tests are needed (p. 45).

Mayer elaborated on this statement through another analysis of the studies. He drew the following conclusions from the second analysis

1. A materials-by treatment interaction suggests organizers are more effective when material is poorly organized than when it is in a spiral or organized format

2. A knowledge-by-treatment interaction suggests organizers more strongly benefit students who are inexperienced in the subject area and who have a limited subsuming context already available

3. Ability-by-treatment interactions are inconclusive. Organizers have, in some cases benefited low ability students. In other cases there has been no apparent interaction

4. A treatment-by-posttest interaction suggests organizers aid transfer learning more than specific retention of details (Mayer, 1979b)

In summary, the use of advance organizers to improve learning and retention has been studied extensively with nonhandicapped, mature learners. Empirical evidence supporting the use of advance organizers was initially offered by Ausubel and his colleagues. The advance organizer has since been modified in design, presentation, and content and used with students of different ages and ability. Despite equivocal results from a number of studies, an analysis of well-designed studies suggests tentative support for the advance organizer technique if the material to be learned as not well-organized to begin with and if students have limited prior knowledge of the subject. Evidence pertaining to advance organizers and handicapped students is limited and, as yet, inconclusive.

CONCLUSIONS REGARDING THE USE OF ADVANCE ORGANIZERS WITH LEARNING DISABLED STUDENTS

When a teacher constructs an advance organizer, he or she identifies the main concepts imbedded in the material to be learned and remembered and presents these concepts, in logical sequence, in advance of presenting the information which the student is expected to learn. Advance organizers are different from overviews in that overviews are simply summaries of the information to be learned. When the teacher constructs an overview, he or she doesn't attempt to identify the organizing ideas or concepts in the material to be learned. The examples presented previously illustrate the difference between an advance organizer and an overview. An overview prior to the introduction of a multiplication matrix would simply inform students of the purpose of a multiplication matrix and that all of the basic multiplication facts are represented in the matrix. An advance organizer, by contrast, would focus on a concept, the commutative property of multiplication.

Simply stated, the assumption underlying the use of advance organizers is that they act as a superstructure for organizing information to be learned and remembered. For some, the advance organizer activates an existing scheme or structure. For others, the advance organizer provides the scheme or structure. The study conducted with learning disabled children, reported previously (Edgar, 1981) can be used to illustrate this point. The organizing scheme for the material used in that study was that information about animals could be learned and remembered by a set of attributes: appearance, habitat, food preference, etc. For some students who participated in this study, the advance organizer may have had an "aha" effect. That is, the student may have been alerted to use an organizing scheme with which he or she was already familiar. For other

students, this particular idea, that information about animals can be learned by attribute, may have been a new idea. The point is that advance organizers serve different functions depending upon the student's existing knowledge.

Several studies of the effectiveness of advance organizers have been conducted with students who are not classified as handicapped. Most of the studies have used college students as subjects. These studies indicate that advance organizers are most useful when the organizing ideas are not already explicit in the material which students are expected to learn and remember. There is also evidence that advance organizers are most likely to benefit students who have limited prior knowledge of the subject they are studying. Finally, available data suggest that advance organizers may aid transfer learning more than retention of details. If this is true, it is probably because advance organizers are concepts and provide a stable means for classifying new information.

Advance organizers appeal to special educators' intuitions about handicapped children, particularly those described as learning disabled. Teachers of learning disabled children generally describe them as disorganized when they try to learn and assume that the children are not as inclined, as non-disabled children, to generate schemes for organizing information to be learned and remembered. This assumption appears to be accurate (Cort, 1980; Dallago & Moely, 1980; Gelzheiser, 1983; Torgesen, 1977).

There is, in fact, no direct evidence that the advance organizer technique actually works with handicapped children, including those described as learning disabled. We believe, however, that this is one instance where practice may proceed parallel with efforts to test the effectiveness of practice. There

is logic in the advance organizer technique, particularly for children described as learning disabled. We offer the following suggestions to teachers who are considering the use of advance organizers in the classroom.

1. Be sure that you understand the distinction between advance organizers and overviews. Study the information you plan to present to students carefully and extract the concepts imbedded in the material for the advance organizer. If you simply summarize facts, you haven't constructed an advance organizer.

2. Advance organizers may be unnecessary if the material is already organized to emphasize the imbedded concepts. To return to the one study conducted with learning disabled children (Edgar, 1981), the material which the students were expected to learn was structured independent of the advance organizer. That is, the facts about the animal were grouped, by attribute, into paragraphs. Failure to find a clear effect for advance organizers for either learning disabled or non-disabled children, was probably a consequence of the fact that the advance organizer was unnecessary.

3. Advance organizers may be more useful when children are expected to learn and remember information presented verbally in the classroom than when they are expected to learn from text. The structure of a verbal presentation is hard to maintain, especially when the teacher is in constant interaction with students. The advance organizer helps to maintain the organizing ideas or concepts for students even though the presentation may lose focus as a result of discussion. Furthermore, in interaction with students, the teacher can focus attention on the organizer and modify it, if necessary.

4. If advance organizers are used with verbal presentations in the classroom, it is probably wise to write the organizer on the chalkboard and/or to give the students copies of the organizer to keep in front of them on their

desks. One of the benefits of this technique is it enables the students to use the advance organizer during study periods.

5. While it may be obvious to all concerned, it seems worth the reminder that advance organizers can compensate for text which doesn't emphasize organizing concepts. Teachers who work with learning disabled children enrolled in regular social studies and science classes may serve their students well by studying the texts used in those classes and working with the teacher to construct advance organizers when the concepts underlying the material in the text aren't explicit.

This report was prepared for several reasons. The main reason was to create a context for thinking about the use of advance organizers with children described as learning disabled. To that end, we have tried to describe and illustrate the advance organizer technique and have reviewed studies designed to assess the effectiveness of advance organizers for different groups of students, including those few studies conducted with students classified as handicapped. We acknowledge absence of empirical support for the advance organizer technique with learning disabled students. Nonetheless, we suggest that an advance organizer, if it is truly an advance organizer, may be useful for some learning disabled students, particularly for lectures and discussions in the classroom.

Teachers should experiment with advance organizers, however, rather than use them uncritically. It is important to remember that the technique doesn't have empirical support and requires confirmation that it is working in the classroom. It is also important to expect variable response to the technique from students since its effectiveness appears to depend on what students already know about the subject they are studying. Finally, it is important to recognize that the use of advance organizers shouldn't replace efforts to teach students to

organize information for themselves.

This last point deserves discussion. The fact that learning in an active, self-directed process is a main theme in contemporary cognitive psychology. There is evidence, both clinical and empirical, that learning disabled children are less inclined than their non-disabled peers to use efficient information processing strategies when they are expected to learn and remember information. Advance organizers may help to compensate for inefficient information processing strategies but, used exclusively, might also tend to limit students' efforts to devise efficient ways to learn for themselves. Since there is evidence that learning disabled children can be taught to detect and use structure for list learning (Cort, 1980; Dallago & Moely, 1980; Torgesen, 1977), and for learning from text (Gelzheiser, 1983), it seems important to plan remedial instruction from two perspectives; imposing structure on information to be learned (advance organizers) and teaching children to search for and use structure in information as an aid to learning. It may be that judicious use of advance organizers will help children learn to organize information for themselves.

It is evident that additional research with learning disabled students is needed to assess the effects of advance organizers on learning and recall. Future studies will need to be carefully designed, keeping in mind the criteria for effectiveness discussed by Mayer (1979a). Research should utilize a variety of learning materials ranging in complexity, structure. and length and should examine performance by learning disabled students at different ages. Particular effort should be made to avoid possible interactions between the structure of learning materials and the organizers themselves. Future studies with learning disabled students must also address such questions as whether the effects of advance organizers are greater for long-term retention than immediate recall and

whether advance organizers facilitate transfer learning more than recall of facts.

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